

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 29 SEP 2006

WIPO PCT

Applicant's or agent's file reference 313688001WO		<b>FOR FURTHER ACTION</b>		See Form PCT/IPEA/416
International application No. PCT/US04/14209		International filing date (day/month/year) 07 May 2004 (07.05.2004)		Priority date (day/month/year) 07 May 2003 (07.05.2003)
International Patent Classification (IPC) or national classification and IPC IPC: H05K 1/00( 2006.01),1/02( 2006.01),1/16( 2006.01),7/20( 2006.01) H01B 13/00( 2006.01) USPC: 174/250,260;216/13;29/846,854				
Applicant MERIX CORPORATION				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>0</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of ___ sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 07 March 2005 (07.03.2005)		Date of completion of this report 26 August 2006 (26.08.2006)		
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201		Authorized officer Shamim Ahmed DEBORAH A. THOMAS PARALEGAL SPECIALIST Telephone No. (571) 272-1700		

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US04/14209

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on:

- ☒ the international application in the language in which it was filed.
- ☐ a translation of the international application into English, which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4(a))
- ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

- ☒ the international application as originally filed/furnished
- ☒ the description:
- pages 1-9 as originally filed/furnished
- pages\* NONE received by this Authority on \_\_\_\_\_
- pages\* NONE received by this Authority on \_\_\_\_\_
- ☒ the claims:
- pages 10-12 as originally filed/furnished
- pages\* NONE as amended (together with any statement) under Article 19
- pages\* NONE received by this Authority on \_\_\_\_\_
- pages\* NONE received by this Authority on \_\_\_\_\_
- ☒ the drawings:
- pages 1/4-4/4 as originally filed/furnished
- pages\* NONE received by this Authority on \_\_\_\_\_
- pages\* NONE received by this Authority on \_\_\_\_\_
- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages none
- ☒ the claims, Nos. none
- ☒ the drawings, sheets/figs none
- ☒ the sequence listing (*specify*): none
- ☒ any table(s) related to the sequence listing (*specify*): none

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/figs \_\_\_\_\_
- ☐ the sequence listing (*specify*): \_\_\_\_\_
- ☐ any table(s) related to the sequence listing (*specify*): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/US04/14209**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims <u>5,6,9,15</u>	YES
	Claims <u>1-4,7,8,10-14,16</u>	NO
Inventive Step (IS)	Claims <u>5,6,9,15</u>	YES
	Claims <u>1-4,7,8,10-14,16</u>	NO
Industrial Applicability (IA)	Claims <u>1-16</u>	YES
	Claims <u>NONE</u>	NO

**2. Citations and Explanations (Rule 70.7)**

Please See Continuation Sheet

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.

PCT/US04/14209

**Box No. VIII Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 1,9 and 16 is objected to as lacking clarity under PCT Rule 66.2(a)(v) because the claim 1 not fully supported by the description. The application, as originally filed, did not describe: The feature of claim 1 that the body has an opening at "one or both" surfaces is not referred to in the description, and each of the embodiments has an opening at both front and back surfaces. Claim is therefore not supported by the description.

The term "transverse dimension" used in claim 1 is unclear because it is not explicitly stated which direction is considered to be "transverse". No non-trivial features of the "third thickness" are presented in dependent claim 9, so that the reader is left in doubt as to what the term means. Thus, the definition of the subject matter of claims 1 and 9 is rendered unclear.

Claim 16 is objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because claim 16 indefinite for the following reason(s): Independent claim 16 does not contain any of the features of the method of assembling a microelectronic substrate in a manner according to the description (pages 8-9).

## Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

## V. 2. Citations and Explanations:

Claims 1-4,7-8,10-14,16 lack novelty under PCT Article 33(2) as being anticipated by Izumi (Document 1,USP 5,459,639 A).

As to claim 1, Izumi discloses that a microelectronic substrate (see Fig. 2) comprising:

A body (11) having a first surface that includes a microelectronic component mounting site configured to receive a microelectronic component (14), a second surface separated from the first surface by a thickness, and an opening extending through the thickness and being outwardly open at both surfaces, the opening having a first portion (11B, which opens onto the second surface) having a first transverse dimension and a second portion (11A, which opens onto the first surface) having a larger second transverse dimension (see Fig. 2);

A thermally conductive member (15), which has a thermal conductivity greater than a thermal conductivity of the body (see col.2, lines 14-15), received in the opening in the body, the thermally conductive member having a first thickness received in the first portion of the opening and a second thickness received in a second portion of the opening, wherein a transverse dimension of the second thickness is greater than the first transverse opening dimension (see Fig. 2).

As to claim 11, Izumi discloses a multilayer printed circuit board (see Fig.2) comprises:

A first body layer (12B and/or 12C) having a first opening (11A) therethrough; a second body layer (12A) juxtaposed with the first body layer and having a second opening (11B) therethrough, the second opening extending outwardly beyond a periphery of the first opening to define an attachment surface on the first body layer (the bottom face of the recess, 11A);

An electrically conductive slug (15) received in and extending between the first and second openings and thermally coupled to the electrically conductive layer (through the solder sheet, 6), the slug including a transversely extending flange (15B) that is attached to the attachment surface.

## Supplemental Box

The dependent claims 2-4,7,8,10,12-14 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step (Article 33(2) and (3) PCT).

The substrate according to Izumi has a mounted and electrically coupled microelectric component (14), and a conductor layer (13B) between the first and second surfaces that is thermally coupled to the thermally conductive member (15) by a solder sheet (16). The conductive member (15) has a radially extending peripheral flange and is integrally formed. Thus, Izumi discloses all the further features of claims 2-4,7,8 and 10.

As to claims 12-14, Izumi shows the solder sheet (16) cements the flange of the thermally conductive slug-member (15), and is electrically as well as thermally conductive, so that the slug-member (15), which may be made of metal (see col.5, lines 5-59), is electrically coupled to the attachment surface, Thus Izumi discloses all the further features of claims 12-14.

Claims 5,6,9 and 15 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the features of the dependent claims 5,6,9 and 15.

The reasons are as follows:

The subject matter of claim 5 differs from the microelectronic substrate disclosed in Izumi (Document 1) in that the body opening includes a third portion, so that the second portion defines a transversely extending recess between the first and third portions.

The problem to be solved by the present invention may therefore be regarded as to provide a means of securely holding the thermally conductive member within the substrate, but which is easy to assemble.

The thermally conductive member according to document 1 is intended to be inserted after lamination of the substrate. The features characterizing claim 5 would prevent this insertion, so that they do not represent a modification that lies within the scope of the normal design practice of the skilled person. Moreover, none of the other documents cited in the ISR discloses a substrate or a thermally conductive member with these features, so that the solution to the above mentioned problem does not form part of the prior art. Thus, an inventive step in the subject matter of claim 5 must be recognized (Article 33(3) PCT).

Claim 15 differs from the printed circuit board according to Izumi in that it has a third body layer, and that the flange of the slug is received between the first and third body layers. These feature correspond to those characterizing in claim 5, and solve the same technical problem. Thus, claim 15 also satisfies the requirements of the PCT with regard to novelty and inventive step (Article 33(2) and (3) PCT).

Claims 1-16 meet the criteria set out in PCT Article 33(4), because the subject matter claimed has use in microelectronic industry.

----- NEW CITATIONS -----